

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

a SB192
•H5A17

KENTUCKY

GRAIN PRODUCTION AND STORAGE SURVEY

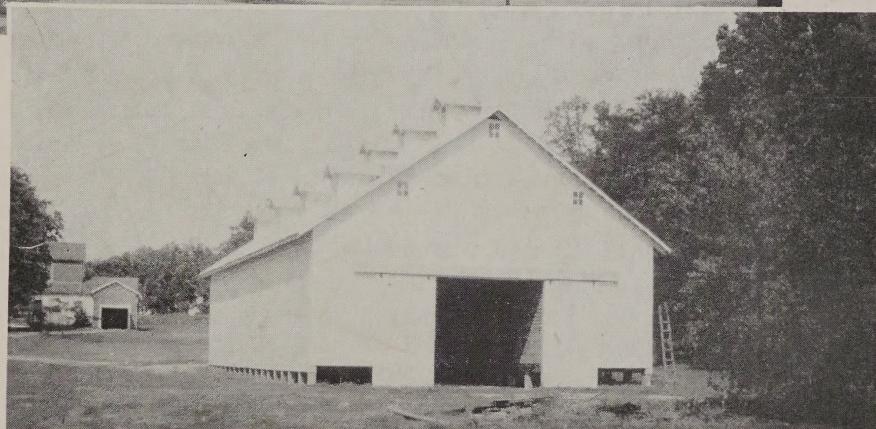
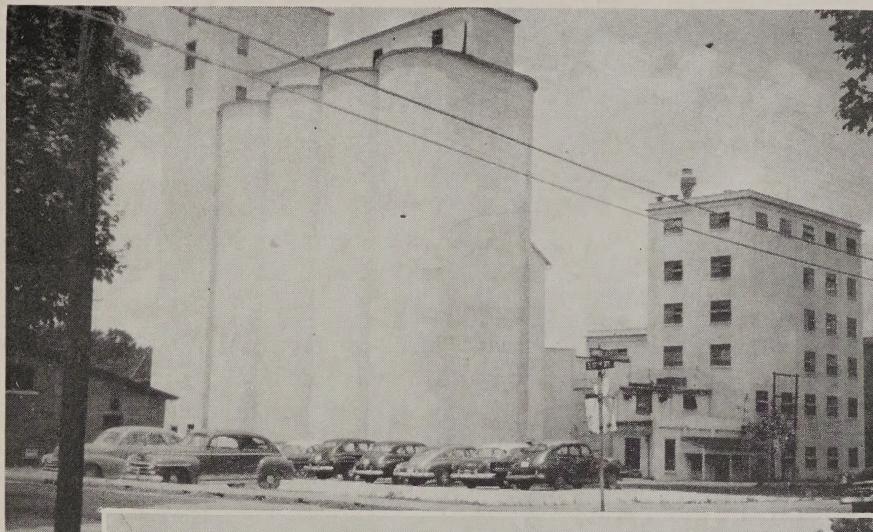
1954 — 1955

by

James M. Koepper, Agricultural Statistician
United States Department of Agriculture
Agricultural Marketing Service

and

Charles H. Ross, Statistical Agent
State Department of Agriculture



A

COOPERATIVE REPORT

Agricultural Marketing Service
U. S. Department of Agriculture
Louisville
H. F. Bryant, Statistician

Division of Markets
Ky. Department of Agriculture
Frankfort
Ben J. Butler, Commissioner

I ACKNOWLEDGEMENTS

This survey is the results of the combined efforts of many people and several governmental agencies in Kentucky.

First of all, we want to express appreciation to all the mill and elevator operators and warehousemen who cooperated so well in the off-farm storage segment of the survey. Likewise, our gratitude goes to all farmers throughout the State who returned the mailed questionnaires giving us pertinent information concerning their grain production and farm storage facilities. Upon personal visitation to a sample of those not replying to the mailed inquiry we obtained excellent response. To all these farmers and grain handlers we owe a vote of thanks for making this survey a success.

Many State and County Agricultural Stabilization and Conservation employees of the U. S. Department of Agriculture helped in drawing the sample of farmers from their rolls. To Mr. W. L. Rouse, formerly State Administrative Officer of the Agricultural Stabilization and Conservation Committee, we give special credit, due to his interest in the project and assistance in compiling the special farm listing.

Mr. M. J. Vinson, Director of Markets, State Department of Agriculture (now Assistant Commissioner of Agriculture) gave valuable assistance in the planning and operational phases of the survey. Several fieldmen of the State Department of Agriculture as well as members of the State Statistician's staff assisted in the field travel associated with the interview of non-respondents. William A. Barnett, while employed by the State Department of Agriculture, played an important part in the data collecting and preliminary summarization phases of the survey.

Special credit also must be given to Mr. Walter A. Hendricks, Head, Research and Development Staff, in the Agricultural Marketing Service, Washington, D. C. for his counsel in regard to the statistical sampling plans and methods involved in expansions to state estimates.

This project was truly a joint endeavor. To carry out the work State funds were matched with Federal funds received from the Agricultural Marketing Service, U. S. Department of Agriculture, under provisions of the Agricultural Marketing Act of 1946.

COVER PHOTOS:

No. 1 Modern mill and elevator for storage and processing of small grains, Christian Co., Kentucky.

No. 2 Modern crib storage for corn, on Guthrie-Russellville road in Todd Co., Ky.

DEC - 4 1973

CATALOGING - PREP.

II TABLE OF CONTENTS

	Page No.
I ACKNOWLEDGEMENTS	Inside Front Cover
III FOREWORD	2
IV SAMPLE AND STATISTICAL PROCEDURES	3
Off-farm Commercial Storage Survey	3
Farm Sample Survey	3
V KENTUCKY GRAIN PRODUCTION, UTILIZATION AND STORAGE	9
Grain Production	9
Disposition of Grain Produced	15
Grain Stocks, All Positions	20
VI COMMERCIAL STORAGE CAPACITY AND FACILITIES	22
Storage Capacity and Survey Coverage	22
Kinds of Grains Normally Stored	25
Description of Facilities	26
Construction	26
Services Available for Preparing Grain for Storage	26
Quantity of Storage Space Usually Rented	27
Newly Constructed Facilities	27
VII FARM STORAGE CAPACITY AND COMPARISONS	27
Total Production and Grain Storage Facilities on Kentucky Farms	27
Description of On-farm Storage Facilities for Ear Corn	29
Description of On-farm Storage Facilities for Small Grains	32
Protection and Care Given to Grains in Storage	33
Storage Capacity vs. Storage Needs	34
VIII CONCLUSIONS	34

III FOREWORD

A thorough study of on-farm and off-farm storages and facilities used for handling grain had never been conducted for the grain industry of Kentucky. With special Research and Marketing Act funds being made available from the U. S. Department of Agriculture on a matched basis this seemed a good time for the State Department of Agriculture to undertake such a study.

The main objectives of the survey were to secure information that might lead to improvement in the marketing and handling of grains in the State and to compile data that would assist in improving existing storage as well as planning for any necessary expansion of off-farm grain storage plus additional storage facilities needed on farms. The grain industry and governmental agencies in Kentucky needed to know more about such questions as (1) how much storage is now available in the State, in both on- and off-farm storage facilities, (2) grain handling facilities available at each commercial plant, (3) arteries of transportation available in the grain areas, (4) grain handling practices used and (5) the major grain marketing and storage problems experienced by farmers and the grain trade.

Plans were to divide the survey into two separate and distinct segments; one the study of off-farm storage facilities, the other, the on-farm type of storage.

A state-wide survey of all **commercial grain storage facilities** would secure necessary information to answer requests by various organizations prior to and during the main harvest season. It was expected to provide very useful information to grain handlers, producers, railroads and other shipping concerns as well as to government agencies. The **off-farm survey** was conducted with the objective in mind of planning a service program to assist farmers or farm groups with storage and handling problems.

Coverage of all commercial grain storage concerns was expected to furnish information on needed improvements in off-farm facilities and practices, in addition to supplying a basis for an intelligent estimate of additional grain storage requirements. This type of information would be especially helpful to the State Division of Markets in promoting grain grading and other service work for the industry. The survey would also supply the Federal Agricultural Statistician's office with up-to-date capacity information on all storage facilities, thereby improving their regularly scheduled quarterly off-farm grain stocks reports.

Objectives of the inquiry into **farm** conditions with respect to the grain storage, handling and marketing practices was to learn more about the volume of grains produced on farms, availability and type of storage on the farm, amount of grain sold, and the facilities and practices used in marketing and storing grain. The survey was also expected to indicate the extent of farmers' knowledge of the various significant factors affecting the farm storage and handling of grains. Indications of needed improvements on many farms were anticipated and these reports were expected to be of material help in deter-

mining areas where a grain service program would be of help to farmers. Information about on-farm storage and marketing practices would be most helpful to the State Division of Markets and other organizations in doing service work with grain producers.

The grain industry needs additional data on where the major grain producing areas are located to aid in determining the need for new commercial storage and processing facilities. This information combined with the commercial grain storage and facilities survey report would present an overall picture of the grain business in Kentucky.

A separate study of the off-farm grain storage establishments in Kentucky was undertaken about the same time as this survey. It was sponsored and carried out by members of the Marketing and Transportation Branch of the Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C. This study was mainly concerned with the type and adequacy of off-farm facilities in various sections of the state. Plans are under way to publish these data. When this is done, the two reports should give a fairly complete picture of grain production and storage in Kentucky.

IV SAMPLE AND STATISTICAL PROCEDURES

Kentucky's grain storage facilities were divided into two segments—one pertaining to off-farm or commercial storage and the other to on-farm storage. The two segments are discussed separately in the paragraphs that follow since procedures involved were quite different and distinct.

(1) The Off-farm Commercial Storage Survey

The off-farm segment represented complete coverage of the State's commercial grain storage plants. A mailed questionnaire (See copy on page 7) was used to secure the desired information. Names of storage establishments were taken from the list of commercial storage plants used by the Federal Agricultural Statistician's office in Louisville. Non-respondents to mailed inquiries after the third request were contacted personally for the data. Response was generally excellent.

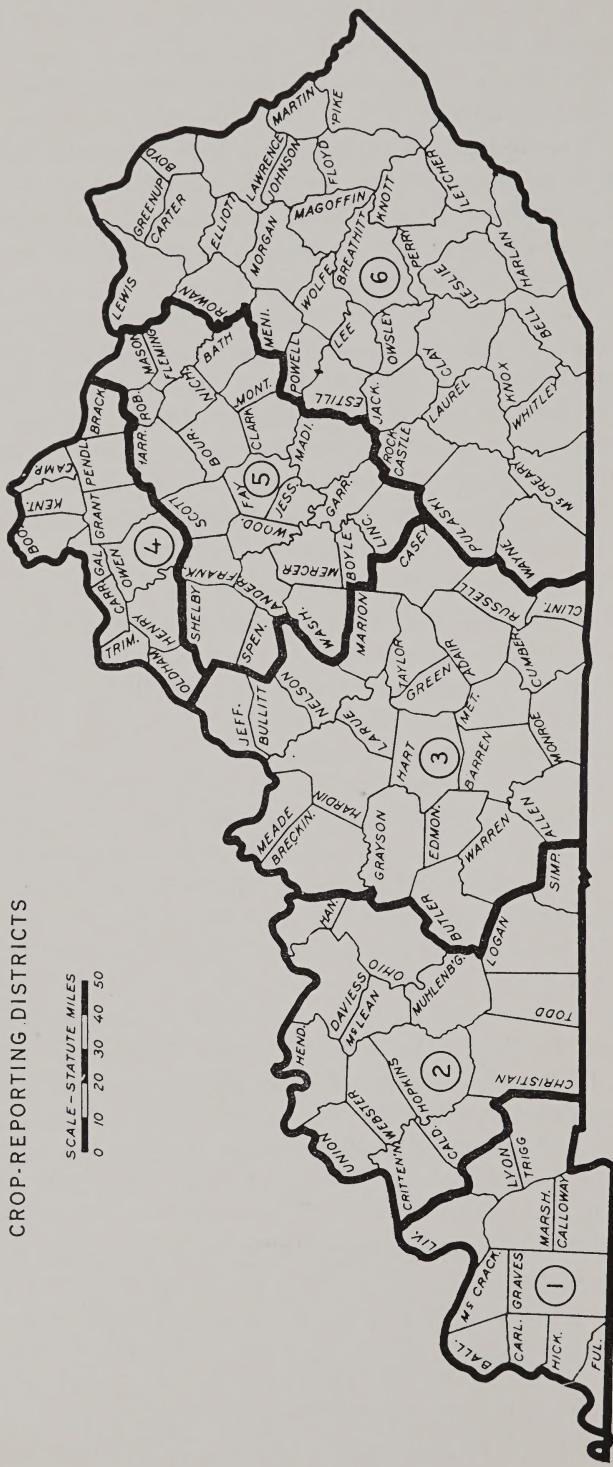
The off-farm data were summarized into the six crop reporting districts of the State (see figure 1). Since this portion of the survey represented a complete coverage of the State's commercial grain storage facilities, the summarization consisted mainly of grouping the various types of storage into district and state totals and analyzing their facilities. Discussions and tables involving this portion of the survey can be found in Part VI of this report.

(2) Farm Sample Survey

Since the task of reaching every farmer in the State was impossible, it was necessary to contact a representative group of all Kentucky farms. A random selection of names was taken from the rolls of the Agricultural Stabilization and Conservation Service. Each of the county offices (formerly P.M.A. offices) cooperated by furnishing a list of names for their county. From this list was selected the final mailing list of about 4,000 randomly selected farms. The number of farms allotted to each county in the State was in proportion to

FIGURE I -- KENTUCKY-- CROP REPORTING DISTRICTS

CROP-REPORTING DISTRICTS



the individual county's total grain production. This was done in order to give proper weight to the heavier grain producing areas.

Questionnaires were mailed to the 4,000 selected farms. After two repeated mailings, a third mailed request was enclosed with a special appeal letter from the State Commissioner of Agriculture. A total of 1,735 questionnaires or 44 percent of those mailed were returned voluntarily.

A sample of those who did not return their questionnaires (non-respondents) was selected for personal visitation. Prior to picking this sample the State was divided into eight strata (See figure 2). These strata corresponded roughly to the six crop reporting districts in Kentucky but with some modification and subdivision. They were delineated in such a way that each stratum contained approximately 500 of the 4,000 farms on the mailing list. One county or pseudo-county was drawn at random from each of the eight strata with probabilities proportional to the number of non-respondents. Then from each of these eight counties or pseudo-counties 25 non-respondents were selected at random for personal interview. Since the number of farms were allocated to counties in proportion to production of corn and small grains it was necessary in some of the strata containing low producing counties to group two or more of these counties into "pseudo-counties" as any single one of them contained less than 25 non-respondents. This was particularly true in the eastern section of the State.

From the sample of 200 non-respondents, 178 reports were tabulated. Due to weather and travel conditions it was impractical with the funds available to get complete coverage of all non-respondents. A system of alternate interviews held call-backs to a minimum, but it was still impossible to make all contacts, especially in some of the rougher, mountainous regions. Hazardous roads and poor weather during the winter months hampered interview work.

Statistical analysis of the on-farm segment of the survey was somewhat more complex than the off-farm segment. Since information was secured for only a representative group of Kentucky farms it was necessary to calculate storage capacities and other items as a ratio to reported corn and small grain production. Estimates were then derived by applying these ratios to the total estimated production in each stratum. Percentages were also frequently used in summarizing sections of the data pertaining to the description of on-farm storage facilities and disposition of grain produced.

Since the enumerated sample was based on the eight-strata division of the state (figure 2), it was necessary to summarize the data on this basis. Those ratios and percentages derived from such individual items as grain disposition and on-farm storage capacity were then weighted by county production of corn and small grains, since this was the way in which the number of sample farms per county was originally allocated.

After the mail and enumerated data were summarized, the stratum summaries of each were combined. This was done as follows: (1) multiplying the stratum summary ratios or averages for the **mail** data by the percent response to the mailed questionnaire. (2) Each stratum summary figure for the

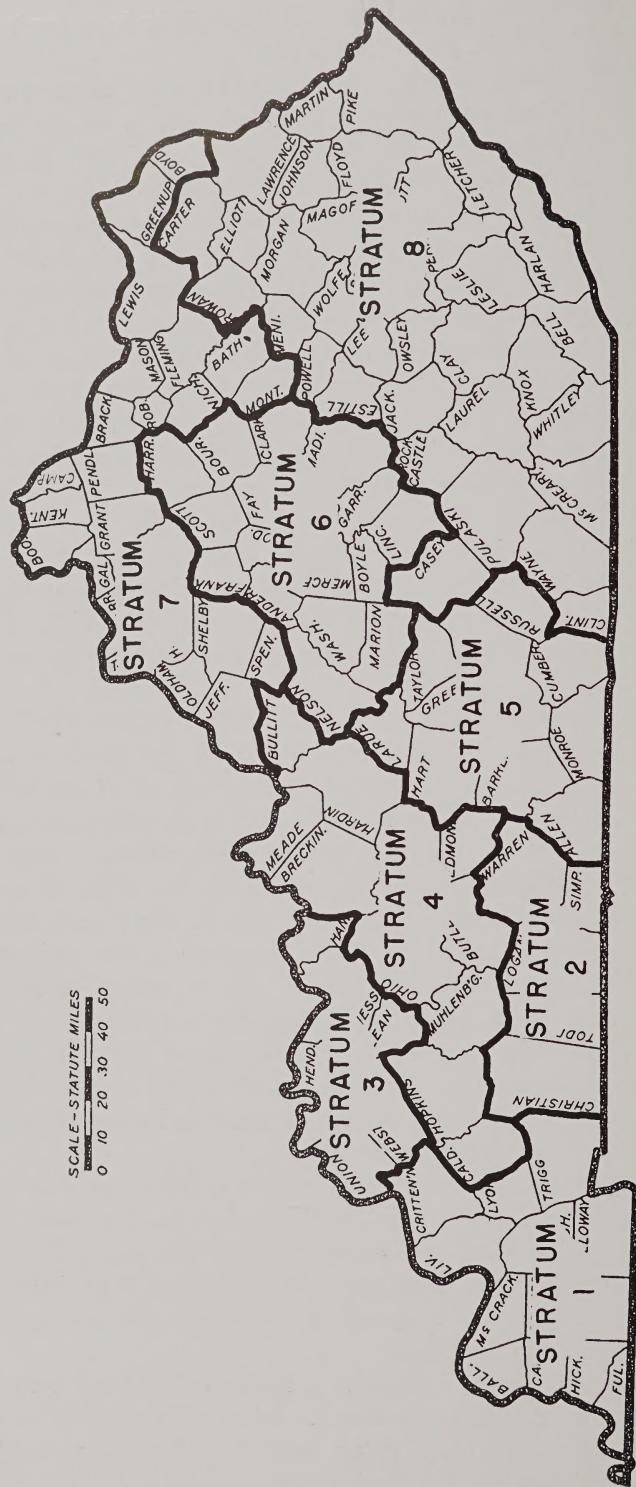


FIGURE 2. -- STRATUM DIVISIONS FOR SAMPLING GRAIN PRODUCTION AND STORAGE FACILITIES IN KENTUCKY

enumerated data was multiplied by the percent non-response. The products of these two multiplications were totaled and the sum divided by 100 percent to get the combined stratum summary figure. The state figures were then derived by simply averaging the eight stratum computations.

To better enable readers to interpret the text and tables that follow it seemed desirable to reproduce the schedules or questionnaires used in this survey. The following are reproduced just as they were sent to our off-farm storage establishments and to the sample of farmers throughout the State.

U. S. Department of Agriculture
Agricultural Marketing Service
Louisville 2, Ky.

Office of Agricultural Statistician, 505 Federal Bldg., Louisville, Ky.

Budget Bureau No. 40-5490
Approval Expires 12-31-54
Kentucky Department of Agriculture,
Division of Markets
Frankfort, Kentucky

KENTUCKY OFF-FARM GRAIN STORAGE SURVEY

October, 1954

GENTLEMEN: From our records we have entered certain information in questions 1 through 6. If any of this information is incomplete or incorrect, please fill in or make necessary corrections.

1. Name under which business is operated _____
2. Mailing address _____
3. Location of storage facility: Town _____ County _____
4. Name of owner _____
5. Name of manager (if different) _____
6. Current rated storage capacity: Bulk _____ bu. Sacked _____ bu.
7. Type and capacity of storage:

Type of Storage	Rated Storage Capacity ¹		Type of Wall Construction (check)			
	Bulk (Bushels)	Sacked ² (Bushels)	Concrete	Wood	Steel	Other Type
(a) Elevator						
(b) Warehouse (storage)						
(c) Corn Cribs		XXXXXXXXXXXX				
(d) Other (describe)						

¹ Incude the storage capacity of elevators and warehouses attached to mills or processing plants.

² Aside from and in addition to bulk capacity shown.

8. (a) Do you sometimes rent out storage space in this plant? Yes _____ No _____
(b) If "yes", what was the maximum amount of storage space that you rented out at any one time during the past 12 months?
 - (1) Bulk space _____ bushels
 - (2) Sacked space (in addition to bulk space) _____ bushels
9. What grains do you normally handle? _____
10. Does your plant have mechanical facilities for the following?
 - (a) CLEANING grain _____ Yes _____ No _____
 - (b) TURNING grain _____ Yes _____ No _____
 - (c) DRYING grain (other than turning or mixing) _____ Yes _____ No _____
11. Do you test grain for moisture? _____ Yes _____ No _____
12. What method do you generally use in handling wet grain? (check one)
 Forced air _____, Heat and forced air _____, Mixing or turning _____, Other _____ (name) _____
13. Is storage space accessible to railroad siding? _____ Yes _____ No _____
14. (a) Is your plant serviced by a Federal-State grain grader? _____ Yes _____ No _____
(b) If "no", would you be interested in a grading service sponsored by the Department of Agriculture? _____ Yes _____ No _____
15. NEW CONSTRUCTION: If construction of additional storage space is definitely planned or underway by your firm give details below:
 - (a) Rated bulk storage capacity being added _____ bu.
 - (b) Rated sacked storage capacity being added _____ bu.
(in addition to bulk capacity)
 - (c) Type of storage and wall construction _____
(See Question 7 on other page)
- (d) Date space is expected to be ready for use _____ Month _____ Year _____

Note: Please list below on this form the name and address of other new grain storage firms now building facilities in your locality.

Signed by _____ Date _____

THIS REPORT WILL BE KEPT STRICTLY CONFIDENTIAL

KENTUCKY ON-FARM GRAIN STORAGE SURVEY
DECEMBER, 1954

Name _____ Address _____

Serial No. _____, County (in which farm is located) _____

1. What was the total acreage in the farm you operated in 1954? (include all land rented from others, but exclude land which you rent to others) _____ Acres

GRAIN STOCKS: Description and Capacity of Facilities on Farm Now

	Answer questions below for each type of storage							
	Corn Crib	Grain Bin	Other: Name type of storage					
2. Type of storage								
3. What material is storage made of? (wood, metal, concrete or other)								
4. What is the bushel capacity of the storage?								
5. Is weather protection in the storage good, fair, or poor?								
6. Is the storage rat proof? (check yes or no)	Yes	No	Yes	No	Yes	No	Yes	No
7. Can grain in the storage be fumigated for weevil control?								
8. Can grain in the storage be properly ventilated?								

9. Is your farm stored grain frequently damaged by:
 (a) Rats and mice Yes _____. No _____.
 (b) Weevils Yes _____. No _____.
 (c) Excessive moisture Yes _____. No _____.
 10. What farm stored grains do you usually fumigate? _____
 11. What method do you generally use in handling wet grain? (check) Shoveling _____,
Forced air _____, Commercial facilities _____, Other (specify) _____
 12. How do you ordinarily store your small grains?
(check one) Sacks _____, Bulk (loose) _____.
 13. What was the most grain storage space you used at any one time on this farm during the past 3 years?
 (a) Ear corn _____(bu.), What month or months? _____
 (b) Small grains _____(bu.), What month(s)? _____
 (c) Soybeans _____(bu.), What month(s)? _____
 14. What additional or replacement storage space is needed on this farm? (Give details on back of this sheet).
 (a) For ear corn bu.
 (b) For small grains (inc. shelled corn and soybeans) bu.
 15. PRODUCTION and DISPOSITION OF YOUR 1954 GRAIN CROPS

	Wheat	Oats	Barley	Corn	Soybeans
(a) Total bushels produced in 1954					
(b) Bushels sold or to be sold					
(c) Bushels fed or to be used on farm					
(d) Bushels stored on farm now					

Name _____ Date _____

THIS REPORT WILL BE KEPT STRICTLY CONFIDENTIAL

V KENTUCKY GRAIN PRODUCTION, UTILIZATION, AND STORAGE

(1) Grain Production

Before a thorough study of the storage of grains can be made in any given area, it is necessary first to learn something about grain production in that area. The more important grains produced in Kentucky are corn, wheat, soybeans, barley, oats, and rye. Since wheat, soybeans, barley, oats, and rye have the common characteristic of requiring rather tightly constructed bins for their storage, they have been grouped together under the common classification of "small grains." Corn has been considered separately since its storage requirements may vary from ear corn stored in a temporary rail pen in the corner of a tobacco barn to shelled corn stored in a steel elevator. These classifications will be used throughout the survey where possible and especially in this section so that grain production can be more easily related to the analysis of grain storage facilities to be discussed later.



Modern method of harvesting corn with picker-sheller machine,
Fulton Co., Ky.

Although **corn** is grown in every county of the state (see figure 3), 67 percent of the state's total 1954 corn production was grown in crop reporting Districts 1, 2, and 3, which comprise 50 of the 120 counties in the state. From these three districts each of the following counties: Graves, Christian, Daviess, Henderson, Hopkins, Logan, Todd, Union, Webster, Barren, Breckinridge, and Warren, produced a million or more bushels of corn in 1954. The total production from these 12 counties represented 45 percent of the total for the three districts and 30 percent of the total production for the state of Kentucky. Pulaski county in District 6 was the only other county in the remaining three crop reporting districts that raised a million bushels or more.

CORN

SCALE - STATUTE MILES

EACH DOT = 10,000 BUSHELS

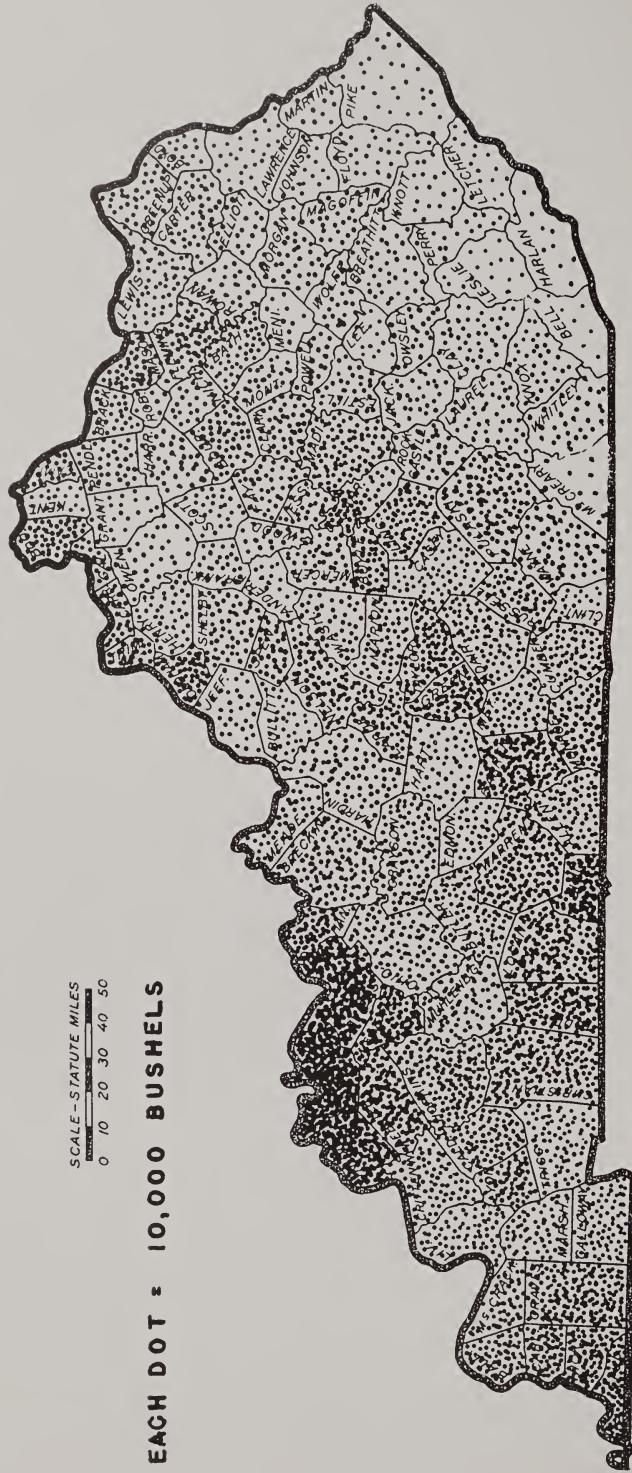


FIGURE 3.--CORN PRODUCTION, KENTUCKY, 1954

Sixty-nine percent of the state's total 1954 production of **small grains** also was grown in Western Kentucky (crop reporting districts 1, 2, and 3 (figure 4).) These three districts contain 42 percent of the counties of the state. From this group of Counties: Fulton, Christian, Daviess, Henderson, Logan, Simpson, Todd, Union, Hardin, and Warren, each produced 400 thousand or more bushels of small grains in 1954. The total production of these 10 counties represented 50 percent of the total production for the three districts and 39 percent of the total production for the state of Kentucky. District 2 led the six crop reporting districts in average production of small grains per county and is by far the most important cash grain area in the state.

In the past years, rather wide fluctuations have occurred in the production of corn and small grains (see figures 5 and 6). These fluctuations, caused largely by economic factors and weather conditions, contribute to problems involved in storage of grains both on and off farms. In periods of high production a sizable amount of off-farm storage space is needed, while in periods of low production a larger proportion of the grain can be stored on farms. Some years there is considerable unused storage in certain sections of the state.

FIGURE 4.--SMALL GRAIN PRODUCTION, KENTUCKY, 1954

TOTAL SMALL GRAINS

SCALE--STATUTE MILES
 0 10 20 30 40 50

EACH DOT = 10,000 BUSHELS

☒ = 10,000 BUSHELS

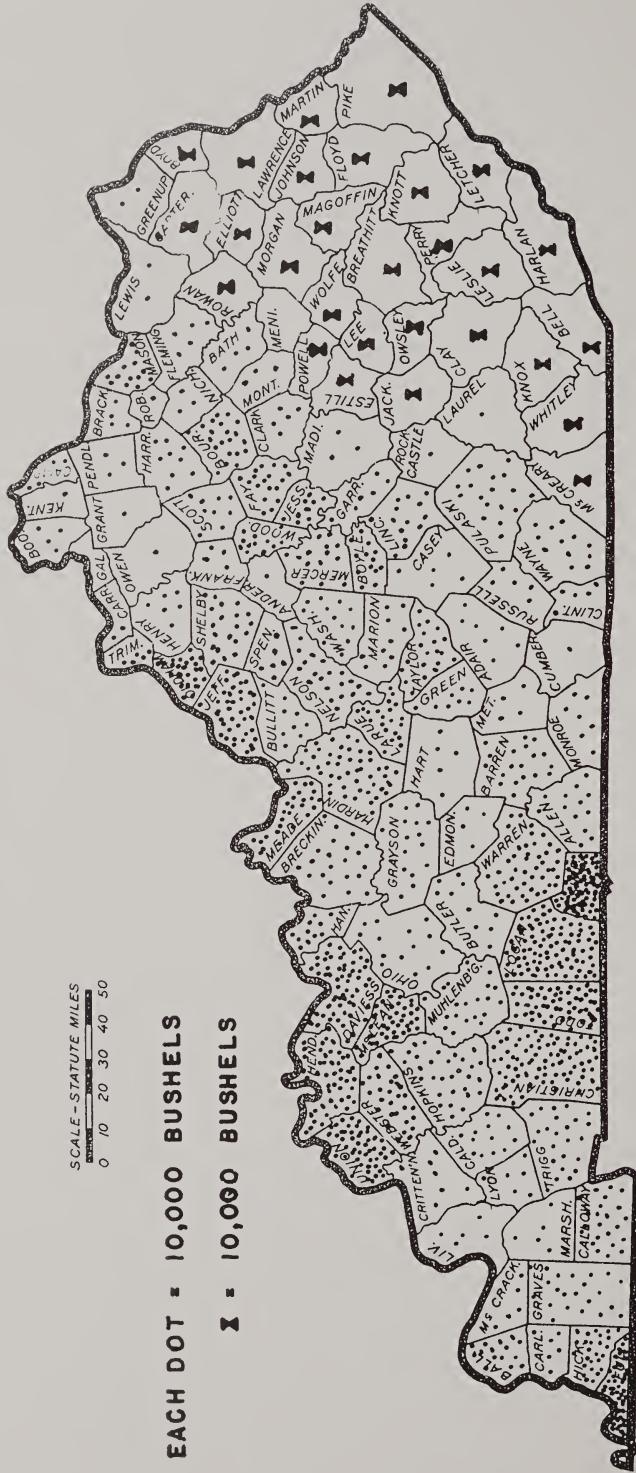


FIGURE 5.-- PRODUCTION OF CORN, KENTUCKY, 1945-'54

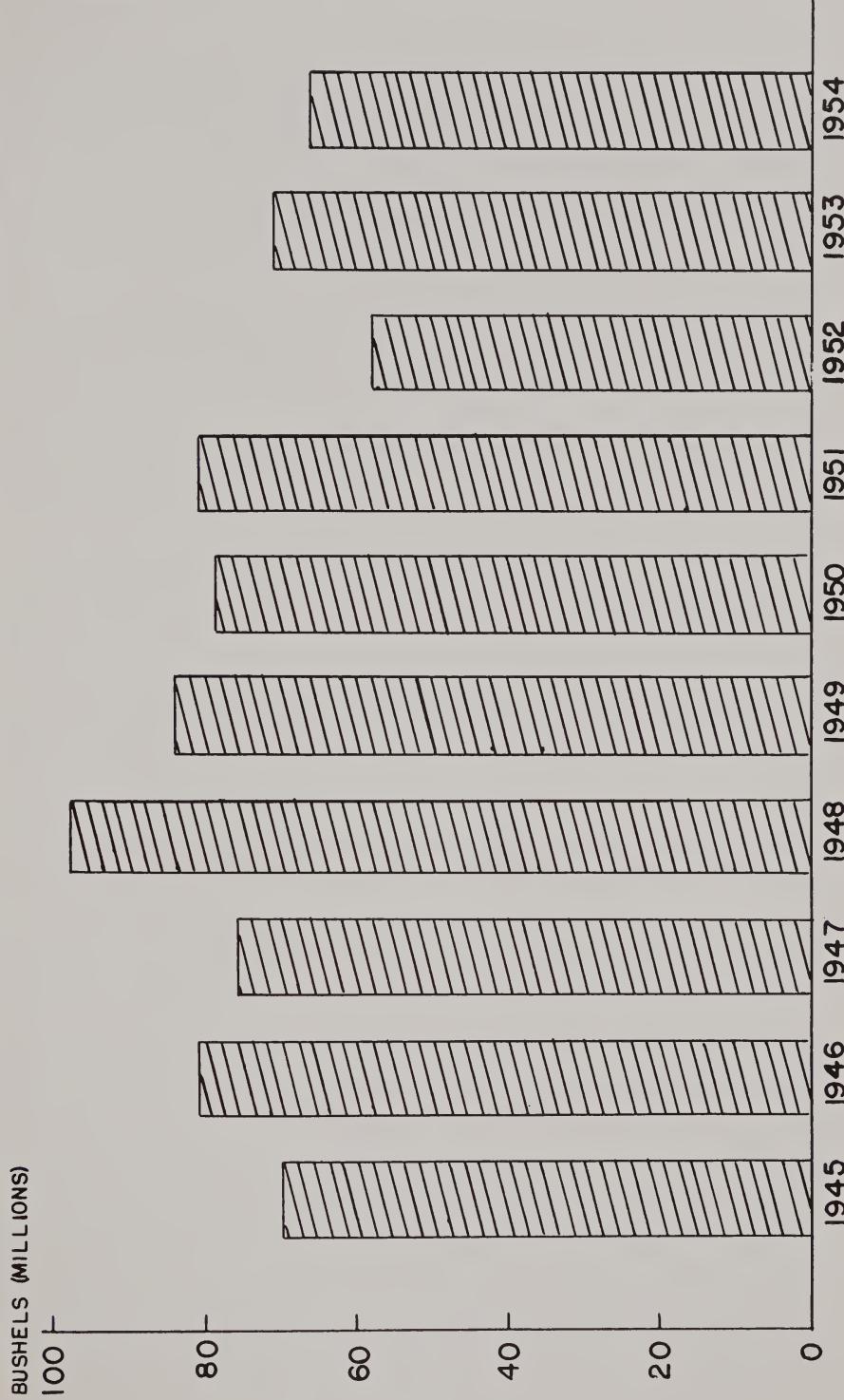
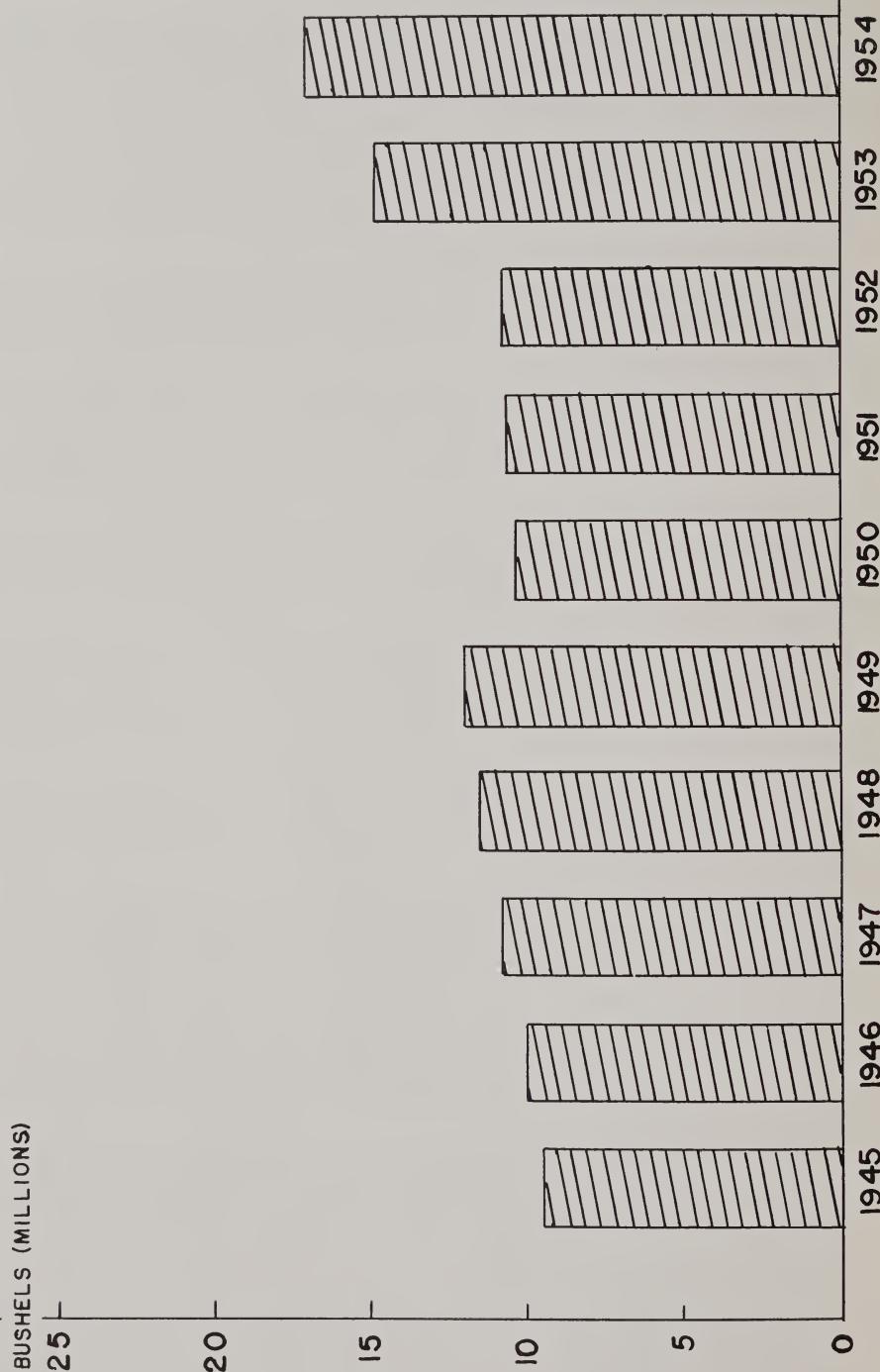


FIGURE 6. -- PRODUCTION OF SMALL GRAIN, KENTUCKY, 1945-'54



(2) Disposition of Grain Produced

An understanding of farm disposition of grains produced is also of utmost importance in determining grain storage requirements. The proportions of each year's grain crop that is sold, used for feed, used for seed, or consumed in the farm home have a great amount of influence in determining the size and type of storage facilities that must be available in any area, both on-farm and off-farm type of facilities.

Commercial storage facilities are generally not needed in areas that use practically all grain produced on farms where grown, especially when grain is not shipped into the area in very large quantities. In such an area the best farm type storage is one in which grains can be held through the winter months for feeding purposes. This area is typified by much of the south central and southeastern section of the state. On the other hand, there are areas in Kentucky that market much of each year's production of grain. In such areas there has been need for commercial facilities to hold grains purchased by grain buyers until it can be moved into other channels of trade. Under these conditions, the on-farm storage facilities may vary from nothing to temporary type facilities depending on how soon after harvest the farmer markets his grain. Should the farmer care to market immediately at harvest time, he needs no farm storage facilities, except for that quantity he expects to hold for farm use. Should he desire to hold his grain until after the usual "market glut" at harvest time he may need only a temporary on-farm storage facility. His other alternative would be to rent storage space from a commercial storage establishment.

Now that the relationship between type and size of storage facilities and farm disposition of grains has been established, the next problems to consider are: How are Kentucky's leading grain crops disposed of, and how does this disposition vary from one section of the state to the others? Historic information on production and farm disposition of major grains in Kentucky prepared by the Agricultural Marketing Service is shown in table 1, pages 16 and 17. Average farm disposition of these major grains for the 10 year period 1945-54 is shown in figure 7 on page 18. These will enable the reader to tell at a glance how Kentucky grain is utilized.

The more detailed discussion to follow is based on the Special Grain Storage Survey. Since this survey required the stratification of the state into more homogeneous grain producing areas known as strata (fig. 2), comparisons among areas within the state has been made on this basis rather than the usual crop reporting districts. Data from the survey apply only to the 1954 crop. The average date of the mailed returns was Jan. 2, 1955.

TABLE 1. PRODUCTION AND FARM DISPOSITION OF GRAIN CROPS,
KENTUCKY, 1945-1954

CORN

Year	Production For All Purposes	Feed and Seed	FARM DISPOSITION		Sold
			For Farm Household Use	Thousand Bushels	
1945	69,792	61,741		1,280	6,771
1946	80,856	70,223		1,155	9,478
1947	76,265	65,453		1,134	9,678
1948	97,600	80,401		1,008	16,191
1949	84,028	72,580		820	10,628
1950	78,810	66,377		850	11,583
1951	80,662	69,605		800	10,257
1952	58,408	50,990		688	6,730
1953	71,106	62,154		675	8,277
1954	66,433	58,170		600	7,663
Avg. Disp. %	100.0		86.1	1.2	12.7

WHEAT

Year	Production	Total Used For Seed	FARM DISPOSITION			Sold
			Used on Farms Where Grown	For Seed	Fed to Livestock	
Thousand Bushels						
1945	5,008	588	441		1,252	242
1946	4,158	606	479		665	204
1947	5,184	630	460		829	189
1948	5,184	604	429		1,037	150
1949	4,896	538	350		979	133
1950	3,900	528	370		741	124
1951	3,568	522	365		535	102
1952	4,600	584	438		736	81
1953	6,974	546	410		1,325	80
1954	5,508	454	318		936	78
Avg. Disp. %	100.0		8.3		18.4	2.8
						70.5

SOYBEANS

Year	Production	Total Used For Seed	FARM DISPOSITION			Sold
			Used on Farms Where Grown	For Seed	Fed To Livestock	
Thousand Bushels						
1945	960	266	98		58	804
1946	1,566	293	176		34	1,356
1947	1,750	333	183		30	1,537
1948	2,299	389	214		46	2,039
1949	2,484	316	117		50	2,317
1950	1,890	283	127		19	1,744
1951	2,470	311	156		49	2,265
1952	1,767	344	155		18	1,594
1953	1,248	312	131		12	1,105
1954	2,048	283	113		41	1,894
Avg. Disp. %	100.0		8.0		1.9	90.1

BARLEY

Year	Production	FARM DISPOSITION		
		Feed	and Seed	Sold
Thousand Bushels				
1945	1,238	1,127		111
1946	1,250	1,100		150
1947	1,325	1,153		172
1948	1,404	1,236		168
1949	1,800	1,557		243
1950	1,480	1,199		281
1951	1,192	1,049		143
1952	1,484	1,291		193
1953	2,295	1,974		321
1954	3,162	2,466		696
Ave. Disp. %	100.0	85.1		14.9

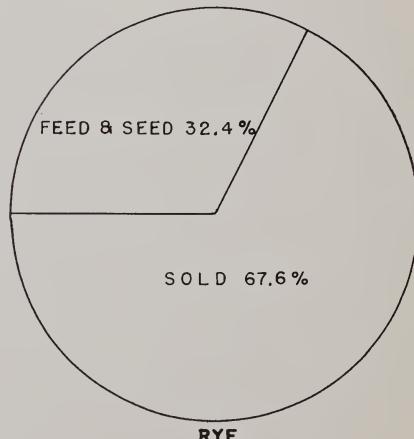
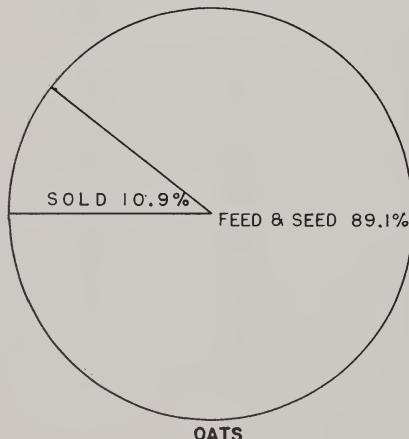
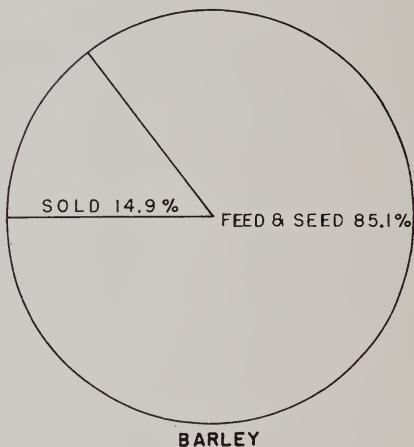
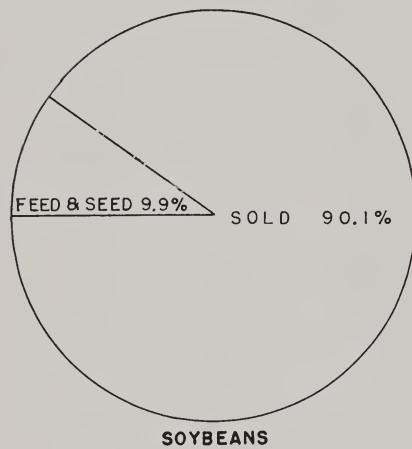
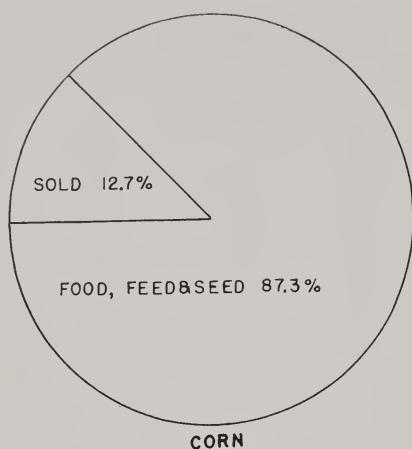
OATS

Year	Production	FARM DISPOSITION		
		Feed	and Seed	Sold
Thousand Bushels				
1945	1,824	1,642		182
1946	2,475	2,252		223
1947	2,070	1,863		207
1948	2,158	1,942		216
1949	2,496	2,271		225
1950	2,832	2,549		283
1951	2,136	1,901		235
1952	2,600	2,366		234
1953	3,874	3,525		349
1954	5,688	4,778		910
Avg. Disp. %	100.0	89.1		10.9

RYE

Year	Production	Total Used For Seed	FARM DISPOSITION		
			Used For Seed	on Farms Where Grown	Fed To Livestock
Thousand Bushels					
1945	500	217	43	125	332
1946	518	197	39	119	360
1947	518	182	36	119	363
1948	420	190	38	109	273
1949	367	181	33	103	231
1950	242	160	27	36	179
1951	204	153	23	61	120
1952	284	201	40	68	176
1953	406	226	47	93	266
1954	544	273	57	82	405
Ave. Disp. %	100.0		9.6	22.8	67.6

FIGURE 7.-- DISPOSITION OF GRAIN, KENTUCKY, 1945-'54 AVERAGE



The survey indicated that around 23 percent of the 1954 corn crop in Kentucky was sold and 77 percent was fed or to be used on farms. The proportions of corn sold and used on farms varied considerably from one area of the state to the others.

In the far western portion of the state, commonly known as the Jackson Purchase (stratum 1) consisting of Ballard, Carlisle, Hickman, Fulton, McCracken, Graves, Livingston, Marshall, Calloway, Crittenden, Lyon, and Trigg counties; the Kentucky grain survey indicated that 31 percent of the 1954 crop was marketed through direct sale with the remaining portion being sold indirectly through livestock. In stratum 3 consisting of the more commercial corn counties of the Ohio River area and including Union, Webster, Henderson, Daviess, McLean, and Hancock counties; 56 percent of the 1954 corn crop was sold with 44 percent kept on the farm for home use and livestock feed. The south central counties of stratum 2 composed of Christian, Todd, Logan, Warren, and Simpson sold through direct sale 39 percent of the 1954 crop. This area is more important for its production of small grains than for corn. The remaining non-commercial portion of the state only sold from 9 to 15 percent of its corn with the remaining portion used on the farm for home use and livestock feed.

The 1954 Kentucky grain survey indicated that 66 percent of that year's wheat crop was sold and 34 percent was fed to livestock. Strata 1, 2, and 3, which represent the Jackson Purchase, the south central area and the Ohio River area, respectively; sold from 91 to 95 per cent of their 1954 wheat crop with the remaining portions being fed or used in the farm home. These three strata represent the state's heaviest small grain producing areas. The area including the counties of Breckinridge, Bullitt, Butler, Caldwell, Edmonson, Grayson, Hardin, Hopkins, Meade, Muhlenberg, and Ohio (stratum 4) marketed 69 percent of its wheat while stratum 6 (The Central Blue Grass Region) was next with 68 percent of 1954 production marketed. The remaining parts of the state used a larger portion of wheat for livestock feed and reported sales ranging from 19-47 percent of the total crop.

Kentucky soybeans are grown mainly to be marketed as raw beans. Since they lend themselves well to rotation with corn, they are produced most abundantly in the important corn producing areas. The counties of the Jackson Purchase Area (stratum 1) marketed 97 percent of their beans and fed only 3 percent on farms. In the more important small grain producing area of the south central counties (stratum 2), 85 percent of the 1954 crop was sold and 15 percent fed to livestock. In the heavy corn producing area of the Ohio River section (stratum 3), 96 percent of the beans harvested were sold and 4 percent fed to livestock. In the area of stratum 4 about 75 percent of the 1954 crop was marketed from the farm and 25 percent used for livestock feed in the form of raw beans. In the northern area of the state (stratum 7) survey data indicated that 73 percent of the 1954 soybean crop was sold and 27 percent was used on the farm for livestock feed. No analysis was made in the remaining portion of the state since it is of little importance in the production of soybeans.

Barley production in Kentucky is more important as a livestock feed crop than for direct cash sales of the grain. The Kentucky Grain Survey indicated that 85 percent of the state's total 1954 production of barley was fed to livestock and 15 percent was marketed directly from the farm. In the Jackson Purchase Area 71 percent of the 1954 barley crop was fed on farms and 29 percent sold. Survey data indicated 75 percent of the barley fed and 25 percent sold in the more important small grain producing counties of Christian, Logan, Simpson, Todd, and Warren (stratum 2). The Ohio River area of stratum 3 indicated that about 82 percent of the 1954 barley crop was fed on farms and 18 percent was sold. Stratum 5, which includes the counties of Adair, Allen, Barren, Cumberland, Green, Hart, Larue, Metcalfe, Monroe, Russell and Taylor, sold the highest percent of the 1954 barley crop in Kentucky. Here, 34 percent was sold and 66 percent was fed on farms to livestock. The remaining areas of the state fed from 95 to 100 percent of their barley production.

Kentucky **oat** production is also used largely for livestock feed. Survey indications show that about 84 percent of the state's total 1954 production of oats was fed to livestock and 16 percent was sold. Data from stratum 1 indicated about three-fourths of the 1954 crop was fed to livestock and one-fourth sold. These same percentage figures also prevailed in strata 2 and 3. Survey data indicated that the counties of stratum 4 fed 83 percent of their oats and sold 17 percent. These disposition figures are very similar to those of the mountain area (stratum 8) where 82 percent was fed to livestock and 18 percent sold. The remaining portions of the state: The Knobs Area (stratum 5), The Central Blue Grass Area (stratum 6), and the Northern Area (stratum 7), fed from 92 to 100 percent of their oat production.

(3) Grain Stocks, all Positions

Stocks of grain in storage at various times throughout the year are closely related to the production and disposition analysis just presented. Large stocks of grain carried over from previous years may directly or indirectly cause grain producers to alter future production plans. Although the maximum amount of grain that may be stored in both on-farm and off-farm positions at any given time is dependent upon the storage facilities available; over a long period of time storage facilities may be added in keeping with the trend of storage needs. Therefore, historical information concerning grain stocks is necessary in analyzing the grain marketing situation and appraising the storage capacity to meet current and future needs.

Kentucky stocks of grain on-and off-farms, by quarters (4 times per year) for the ten year period 1945-54 are presented in table 2, p. 21. Off-farm stocks include grain in interior mills, elevators, warehouses, merchant mills, commercial stocks at terminals, and those stocks of grain which are owned by the Commodity Credit Corporation and are in transit to ports, in bins, ships and other storages under CCC control. Farm stocks are those that are remaining in farm storage on the specified date.

TABLE NO. 2. KENTUCKY STOCKS OF GRAIN, ON- AND OFF-F FARMS,
BY QUARTERS, 1945-54

Year and Quarter	CORN			WHEAT		
	On-Farms	Off-Farms	Total	On-Farms	Off-Farms	Total
Thousand Bushels						
1945 January	42,343	1,431	43,774	834	.....	.....
April	23,591	777	24,368	531	.....	1,141
July	9,074	1,025	10,099	227	.....	.....
October	6,049	196	6,245	1,302	5,034	6,336
1946 January	47,443	932	48,375	501	3,151	3,652
April	28,466	1,317	29,783	351	1,508	1,859
July	14,233	682	14,915	275	189	464
October	6,778	677	7,455	1,081	3,809	4,890
1947 January	56,868	1,357	58,225	249	2,209	2,458
April	34,753	1,069	35,822	166	1,169	1,335
July	19,746	564	20,310	83	208	291
October	7,109	532	7,641	1,244	5,016	6,260
1948 January	53,600	1,581	55,181	415	3,685	4,100
April	29,034	970	30,004	259	2,341	2,600
July	14,145	619	14,764	130	505	635
October	5,211	390	5,601	933	4,683	5,616
1949 January	71,430	1,695	73,125	311	3,553	3,864
April	45,715	992	46,707	207	1,819	2,026
July	26,667	1,282	27,949	52	422	474
October	8,572	475	9,047	734	6,215	6,949
1950 January	54,777	1,668	56,445	269	4,474	4,743
April	31,885	1,243	33,128	147	2,809	2,956
July	13,899	1,271	15,170	49	1,332	1,381
October	5,723	537	6,260	930	5,296	6,226
1951 January	51,563	1,533	53,096	186	4,511	4,697
April	30,014	1,898	31,912	74	2,818	2,892
July	13,853	1,454	15,307	56	1,202	1,258
October	5,002	958	5,960	571	4,769	5,340
1952 January	52,863	2,566	55,429	196	3,232	3,428
April	29,193	2,417	31,610	107	2,076	2,183
July	15,780	1,579	17,359	71	774	845
October	5,523	963	6,486	828	5,871	6,699
1953 January	40,380	2,181	42,561	299	4,040	4,339
April	17,947	1,761	19,708	207	2,169	2,376
July	9,534	1,267	10,801	115	521	636
October	4,487	803	5,290	2,101	5,637	7,738
1954 January	48,283	2,439	50,722	1,152	4,039	5,191
April	26,211	2,531	28,742	881	2,983	3,864
July	13,795	2,226	16,021	203	2,563	2,766
October	4,828	1,994	6,822	1,728	6,940	8,668

TOTAL STOCKS OF GRAINS ON- AND OFF- FARMS BY QUARTERS, 1945-54

Year and Quarter	SOYBEANS			BARLEY		
	On-Farms	Off-Farms	Total	On-Farms	Off-Farms	Total
Thousand Bushels						
1945 January	396	1	.....	695	50	745
April	248	1	.....	278	37	315
July	40	1	.....	218	30	248
October	10	1	.....	842	37	879
1946 January	288	1	.....	569	65	634
April	211	1	.....	260	20	280
July	29	1	.....	198	20	218
October	10	1	.....	638	22	660
1947 January	360	1	.....	350	16	366
April	251	1	.....	200	20	220
July	86	1	.....	125	9	134
October	8	0	8	662	55	717
1948 January	472	2,703	3,175	398	20	418
April	420	36	456	199	20	219
July	131	903	1,034	93	9	102
October	18	2	20	491	42	533
1949 January	690	2,764	3,454	337	22	359
April	460	1,748	2,208	168	18	186
July	161	879	1,040	49	18	67
October	11	1	12	792	36	828
1950 January	845	3,093	3,938	450	24	474
April	373	1,756	2,129	180	11	191
July	99	1	100	54	12	66
October	12	0	12	672	26	698
1951 January	948	2,653	3,601	470	19	489
April	309	2,319	2,628	218	14	232
July	110	1,015	1,125	84	6	90
October	44	34	78	429	12	441
1952 January	618	2,125	2,743	322	14	336
April	420	1,225	1,645	131	3	134
July	49	707	756	60	5	65
October	12	2	14	683	20	703
1953 January	546	2,453	2,999	341	12	353
April	205	1,712	1,917	126	9	135
July	60	677	737	45	7	52
October	9	2	11	1,010	29	1,039
1954 January	374	2,346	2,720	620	17	637
April	175	44	219	252	12	264
July	12	791	803	92	12	104
October	1	0	1	1,549	58	1,607

¹ Unallocated.

TOTAL STOCK OF GRAINS ON- AND OFF-FARMS BY QUARTERS, 1945-54

Year and Quarter	OATS			RYE		
	On-Farms	Off-Farms	Total	On-Farms	Off-Farms	Total
Thousand Bushels						
1945 January	905	135	1,040	50	123	173
April	418	185	603	20	¹	199
July	261	86	347	6	193	357
October	1,240	119	1,359	185	172	211
1946 January	930	184	1,114	55	156	179
April	456	121	577	38	141	538
July	237	63	300	25	96	121
October	1,485	258	1,743	212	326	639
1947 January	1,312	123	1,435	23	616	462
April	693	89	782	21	441	292
July	248	73	321	5	287	588
October	1,159	143	1,302	233	355	305
1948 January	932	101	1,033	67	238	221
April	518	102	620	36	185	176
July	269	80	349	13	163	471
October	1,381	199	1,580	105	366	246
1949 January	993	79	1,072	38	208	130
April	388	118	506	15	115	76
July	216	59	275	4	72	254
October	1,498	68	1,566	70	184	148
1950 January	1,098	107	1,205	24	124	125
April	424	104	528	11	114	90
July	150	67	217	4	86	405
October	1,480	95	1,575	121	284	221
1951 January	888	89	977	29	213	134
April	364	114	478	10	162	167
July	137	85	222	5	271	344
October	1,495	139	1,634	73	319	335
1952 January	833	119	952	16	183	195
April	342	107	449	12	58	60
July	85	94	179	2	169	226
October	1,170	100	1,270	57	164	296
1953 January	832	204	1,036	23	273	173
April	312	169	481	9	72	175
July	104	64	168	3	132	360
October	2,479	176	2,655	187	154	160
1954 January	1,743	120	1,863	28	87	154
April	736	99	835	16	79	138
July	387	94	481	8	267	87
October	3,242	111	3,353	190	457	457

¹ Unallocated.

During the ten year period of 1945-54 an average of 95 percent of Kentucky's **corn** stocks were stored on-farms with the remaining 5 percent stored in off-farm positions. **Wheat** stocks during this ten year period indicated that an average of 86 percent of the grain was stored in off-farm positions with 14 percent stored on-farms. **Soybeans** during the seven year period of 1948-54 showed an average of 81 percent of the beans stored in off-farm positions and 19 percent in on-farm storage. **Barley** stocks averaged 94 percent stored on-farms and six percent in off-farm positions during the ten year period of 1945-54. During this same period **oat** stocks averaged 88 percent stored on-farms and 12 percent in off-farm facilities. **Rye** stocks; on the other hand, averaged 80 percent stored off-farms and 20 percent on-farms during this ten year period.

Wheat and barley stocks showed a marked increase in the quantity of grain stored in on-farm facilities during the October quarters of 1953 and 1954 (table 2). This would indicate that more on-farm storage space has been made available for small grains during the past few years.

VI COMMERCIAL STORAGE CAPACITY AND FACILITIES

(1) Storage Capacity and Survey Coverage

Names of off-farm storage facilities were secured from the most complete list of commercial storage plants available, compiled by the Federal Agricul-

tural Statistician's office in Louisville. Questionnaires such as the one found on page 7 were mailed to 140 commercial grain storage plants. All of those plants that did not answer the mailed inquiries were contacted personally for the information.

These 140 commercial storage plants reported a total capacity of 17,689,574 bushels of grain for the state of Kentucky in 1954. Of this total capacity, 15,333,387 bushels was in bulk storage and 2,356,187 bushels was facilities for sacked grains. Further analysis indicated that 14,250,467 bushels of the bulk storage was in elevators; 825,370 bushels was flat storage in warehouses and 215,150 bushels was in corn cribs. Most of the sack storage was in the flat warehouse type of facility. This study excluded the grain storage bins controlled by the U. S. Government, i.e., those operated by the Commodity Credit Corporation.

In the far western portion of the state (west of the Tennessee river) known as the Jackson Purchase, the capacity of commercial storage facilities totaled 448,700 bushels in 1954. This total can be further broken down into 310,500 bushels of bulk storage and 138,200 bushels of facilities for sacked grains. The complete 138,200 bushels of sack storage capacity was flat storage in warehouses while the bulk capacity was divided into 248,000 bushels in elevators; 45,800 bushels in corn cribs; and 16,700 bushels in grain bins.

The important corn and small grain producing area of crop reporting district 2 including the counties of Caldwell, Christian, Crittenden, Daviess, Hancock, Henderson, Hopkins, Logan, McLean, Muhlenberg, Ohio, Simpson, Todd, Union, and Webster reported a total commercial grain storage capacity of 4,566,800 bushels of grain. Bulk storage accounted for 3,631,300 bushels of capacity while facilities for sacked grains made up the remaining 935,500 bushels. The complete total number of bushels of sacked grain capacity was flat storage in warehouses. Of the 3,631,300 bushels of bulk storage capacity, 2,759,880 bushels was in elevators; 763,420 bushels was in flat storage warehouses and 106,000 bushels was in corn cribs. The remaining 2,000 bushels of grain storage capacity was represented by other types of storage facilities.

The total reported commercial grain storage capacity of crop reporting district 3 (figure 1) in 1954 was 10,352,850 bushels. This was 59 percent of the total commercial storage capacity for the state and is dominated by the rather large establishments in Louisville. In this district, 9,902,150 bushels of capacity was bulk storage and 450,700 bushels was in facilities for sacked grains. The bulk capacity was distributed into 9,834,000 bushels in elevators, 37,050 bushels of flat storage in warehouses, and 27,900 bushels in corn cribs. Of the sacked storage capacity 447,700 bushels was flat storage in warehouses. The remaining 6,200 bushels of capacity was in other types of facilities such as grain bins and temporary storage.

In the northern Kentucky counties of crop reporting district 4 a total of 325,074 bushels of commercial storage space was reported. About 179,287 bushels of this capacity was bulk storage and 145,787 bushels was storage for



Harvest time—unloading line of trucks at one of the large Louisville grain terminals.

sacked grains. The complete capacity for sacked grains was flat storage in warehouses. The bulk capacity was divided into 177,587 bushels in elevators and 1,700 bushels in corn cribs.

Commercial storage plants of the Blue Grass Region of central Kentucky reported a total capacity of 1,780,750 bushels in 1954. A total of 1,227,250 bushels was bulk storage and 553,500 bushels was storage for sacked grains. Elevators accounted for 1,177,000 bushels of bulk storage. A total of 5,000 bushels of bulk capacity and 535,500 bushels of sacked grain capacity was flat storage in warehouses. Corn crib capacity was reported at 25,250 bushels and an additional 20,000 bushels of bulk storage was in other types of facilities.

In the eastern mountain region of crop reporting district 6 a commercial storage capacity of only 215,400 bushels was reported. Of this capacity 82,900 bushels was bulk storage and 132,500 bushels was in facilities for sacked grains. Of the bulk capacity 54,000 bushels was in elevators; 19,900 bushels was flat storage in warehouses and 8,500 bushels in corn cribs. The storage capacity for sacked grains was mostly flat storage in warehouses.

(2) Kinds of Grains Normally Stored

Seven grains were reported as being stored by Kentucky commercial storage plants in 1954. Some of the state's 140 storage plants reported storing as few as one kind of grain while others reported handling as many as six different grains. As for the frequency with which these grains were handled; 121 plants reported storing corn; 119 reported handling wheat; 62 handled oats; 39 reported handling barley; 27 handled rye; 16 reported handling soybeans; and only one handled grain sorghum regularly.

Within the state, the frequency with which each of the grains were handled by commercial storage plants varied somewhat among crop reporting districts. In the Jackson Purchase region of District 1, 81 percent of the commercial plants reported storing corn, 69 percent reported handling wheat, 44 percent stored oats, and 13 percent handled soybeans. Only six percent of the plants handled barley and rye. In the more important corn and small grain producing area of District 2, 33 of the 37 reporting commercial storage plants reported storing corn, 30 reported storing wheat, 12 handled oats, 10 stored barley, eight handled soybeans and four reported handling rye. In crop reporting District 3, 34 of the 36 commercial facilities reported storing corn, 33 stored wheat, 23 stored oats, 10 stored barley, eight handled rye, three reported soybeans, and one reported storing milo. In the northern counties of District 4, all of the nine commercial plants reported storing corn and wheat, while 56 percent stored oats and 22 percent handled barley and rye. In the Blue Grass region of District 5, a total of 28 of the 31 commercial storage plants reported storing wheat while 21 reported storing corn, 14 stored barley, 12 handled oats and barley, and three reported storage of soybeans. Of the 11 commercial storage plants in the mountain area of District 6, all of the 11 reported storing corn, eight reported storing wheat, three reported oats, and two reported barley.

(3) Description of Facilities

(a) **Construction:** The 1954 grain survey indicated that the predominating material for wall construction of Kentucky commercial storage facilities was wood. Of the **commercial elevators in the state**, 47 percent of them reported having wooden wall construction, 31 percent reported concrete, 19 percent had steel wall construction and three percent had walls constructed from some other material such as tile or brick. Seventy-three percent of the flat storage warehouses reported wooden walls, 11 percent reported steel walls, nine percent reported concrete, and seven percent reported wall construction of some other material such as brick. Of the commercial corn cribs in Kentucky, 80 percent of them reported wooden wall construction, 10 percent reported concrete and 10 percent steel. All of the other types of facilities such as grain bins and temporary storages reported wall construction of wood.

Wall construction of the various types of commercial facilities within the state remained very near the same proportions as reported in the above state summary; except in crop reporting District 2 where 40 percent of the elevators had walls constructed of concrete, 37 percent of them constructed of wood, and 23 percent were steel. In the mountain area of District 6, all of the elevators were reported as constructed with wooden walls.

(b) **Services Available for Storing and Handling Grain:** On the basis of the 1954 grain survey, 75 percent of the commercial storage plants of the state reported having **mechanical facilities for cleaning grain**. Ninety-three percent of the plants in the Blue Grass region reported having such equipment while only 56 percent made this service available in the Jackson Purchase region. Sixty-five percent of the plants operated mechanical grain cleaners in the heavy grain producing area of crop reporting District 2.

Seventy-one percent of the storage plants in Kentucky operated **mechanical grain turning equipment**. The percentage of total plants reporting such services varied from a low of 50 percent in the light grain producing region of the mountain counties to 81 percent in the heavy producing area of District 2. This percentage varied from 63 to 78 percent in the remaining areas of the state.

Of the commercial grain storage plants in the state, 65 percent of them reported that they **tested grain for moisture**. This percentage varied from 22 percent in the mountain region to 89 percent in the important grain producing area of District 2. As for the method used in **handling wet grains**, one percent of the state's commercial facilities used forced air, 37 percent used heated forced air, and 62 percent mixed and turned their grains.

Reports from 136 of the commercial grain storage plants in Kentucky indicated that 54 percent of these plants were **accessible to a railroad siding**. This percentage varied from 27 percent in the mountainous area to 67 percent in the heavy grain producing area of District 2.

The survey also indicated that 15 percent of the commercial plants in the state was serviced by a **Federal-State grain grader**. Of the 85 percent not having a grain grader only 25 percent desired such a service.

(4) Quantity of Storage Space Usually Rented

Of the 15,333,387 bushels of commercial bulk storage space in Kentucky in 1954, only 1,043,330 bushels were reported as sometimes rented. A further breakdown by areas of the state indicated that 10,000 bushels of this rental capacity were available in the Jackson Purchase region of crop reporting District 1; 646,000 bushels were available in the heavy grain producing area of District 2; 204,000 bushels were available in District 3; 300 bushels for rent in the northern counties of District 4; and 183,000 rental bushels in the Blue Grass Region of District 5. There was no capacity reported available for rent in the low grain producing region of the mountains in District 6.

Commercial capacity for sacked grains in the state in 1954 was rated at 2,356,187 bushels. From this capacity, a total of 20,000 bushels was reported as sometimes rented. The total amount of this rental space was available in the heavy grain producing area of crop reporting District 2.

(5) Newly Constructed Facilities

The 1954 grain survey indicated that only 220,000 bushels of newly constructed commercial capacity was definitely planned or was under construction at the time of the survey. Since that time, however, there has been one large elevator completed and considerably more old storage replaced. There seems to be adequate off-farm grain storage now in most sections of the state, but a number of facilities for loading or unloading need to be modernized.

VII FARM STORAGE CAPACITY AND COMPARISONS

(1) Total Production and Grain Storage Facilities on Kentucky Farms

Expansion of the returns from sample farms included in the 1954 grain survey indicated that there was 107,408,000 bushels of total storage capacity available on Kentucky farms. This total capacity includes both temporary and permanent types of storage facilities. Figure 8 shows a breakdown by stratum of total grain production and total estimated on-farm grain storage capacity. The top figure in each stratum is the per farm ratio of average reported storage capacity to average reported production of all grains. The middle figure is the total grain production in thousands of bushels, and the bottom number represents the total estimated storage capacity on farms, with the unit of measure also in thousands of bushels.

FIGURE 8 -

STRATUM DIVISIONS SHOWING:

(1) Top Figure - Per Farm Ratio of Average Reported Storage to Average Reported Production

(2) Middle Figure - Total Grain Production in Thousands of Bushels

(3) Bottom Figure - Estimated Total Storage Capacity on Farms in Thousands of Bushels

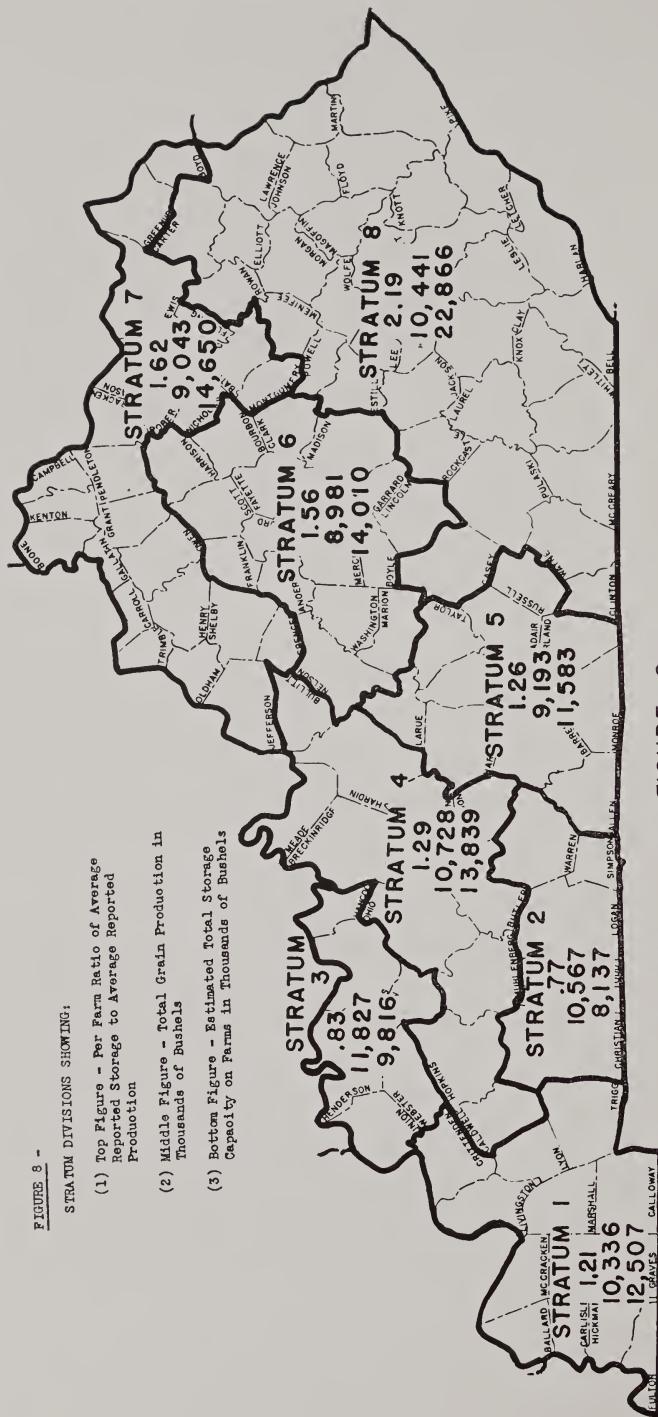


FIGURE 8.

Since the ratios of strata 2 and 3 are less than 1.00, their total 1954 grain production was more than their estimated capacity. This was due to the fact that these are the commercial grain producing areas and much of the grain is sold at harvest time and is never stored on the farm. The remaining non-commercial grain sections of the state had ratios higher than 1.00. This indicated that these areas have more total on-farm storage capacity than they had grain production in 1954.

Much of this over abundance of storage space in the non-commercial areas is largely due to a long term changing trend in grain production, a shifting from these areas to the current commercial grain producing areas of the state. This fact is more evident when the information presented in table 3 is examined. Since 1939, the percentage of the total production of all grains in the state has decreased in all Crop Reporting Districts except in the commercial grain producing area of Crop Reporting District 2. In this district, this percentage has jumped from 23.8 in 1939 to 32.1 in 1954. Therefore, in the remaining five crop reporting districts the percentage of the state's total grain production declined from 76.2 percent in 1939 to 67.8 percent in 1954.

The largest indicated surplus of on-farm storage space is indicated to be in strata 6, 7, and 8. Since the area included by these strata coincides quite closely with that of crop reporting districts 4, 5, and 6, direct comparisons may be made. Evidence that total grain production is decreasing in these strata is shown in table 3, when total grain production is compared for the years 1939 and 1954 in districts 4, 5 and 6. This decrease has left behind unused storage facilities, and this fact is reflected in the ratio of average reported storage capacity to average reported production of all grains.

In stratum 8 where the amount of unused storage capacity is the largest, the decline in total grain production from 1939 to 1954 is also largest for approximately this same area delineated by District 6. Two factors have brought about much of this decline in grain production in this area during the past 25 to 30 years: (1) decrease in acreage planted to grains by individual farmers as there has been some shift to grassland farming, and (2) decrease in land tenure as many farmers have left the land idle and moved into other types of work.

(2) Description of On-Farm Storage Facilities For Ear Corn

The **type of material** used in the construction of on-farm storage facilities for ear corn was summarized by totaling the bushels of capacity for each type of construction. This so-called weighting by capacity gave a better analysis of construction materials since capacity of on-farm facilities varies widely from one farm to the next. A straight percentage of the number of each type of facility would not include this variance in size.

The 1954 Kentucky grain survey indicated that 94 percent of on-farm storage capacity for ear corn in the state was constructed from wood. Around three percent was constructed from metal and another three percent from other types of materials such as concrete and temporary wire construction. In

TABLE No. 3 GRAIN PRODUCTION IN KENTUCKY, BY DISTRICTS, 1939 and 1954
KENTUCKY GRAIN PRODUCTION—1939

Crop Reporting Districts	Corn (Bu.)	Wheat (Bu.)	Soybeans (Bu.)	Barley (Bu.)	Oats (Bu.)	Rye (Bu.)	Total Production All Grains	
							Production (Bu.)	% of Total
1	8,164,000	350,000	14,664	51,092	29,589	1,962	8,611,307	12.3
2	14,878,000	1,218,000	222,991	169,309	159,372	14,056	16,661,728	23.8
3	16,995,000	965,000	29,013	248,908	373,262	16,127	18,627,310	26.6
4	3,390,000	207,000	1,747	35,389	45,264	3,682	3,683,082	5.2
5	9,223,000	904,000	2,621	272,400	65,057	22,395	10,489,473	15.0
6	11,556,000	209,000	6,374	16,929	169,247	3,074	11,960,624	17.1
State Totals	64,206,000	3,883,000	277,410	794,027	841,791	61,296	70,033,524	100.0

KENTUCKY GRAIN PRODUCTION—1954

Crop Reporting Districts	Corn (Bu.)	Wheat (Bu.)	Soybeans (Bu.)	Barley (Bu.)	Oats (Bu.)	Rye (Bu.)	Total Production All Grains	
							Production (Bu.)	% of Total
1	7,761,000	749,500	511,000	150,072	365,687	39,517	9,576,776	11.8
2	19,948,000	2,447,700	1,340,500	1,277,551	815,148	231,985	26,060,884	32.1
3	16,798,000	1,027,900	160,700	946,253	1,404,220	128,706	20,465,779	25.2
4	3,225,000	243,100	12,900	108,640	182,386	19,244	3,791,270	4.7
5	8,742,000	906,100	10,900	581,953	316,635	293,396	10,850,984	13.4
6	9,959,000	133,700	12,000	85,620	175,011	5,906	10,371,237	12.8
State Totals	66,433,000	5,508,000	2,048,000	3,150,089	3,259,087	718,754	81,116,930	100.0

the Jackson Purchase Area of stratum 1, the percentage of capacity constructed from wood was only 85 percent, lowest for any section of the state. In the Bluegrass Region of stratum 6, 12 percent of the corn cribs were of metal construction with 88 percent constructed from wood. Wood construction predominated in the remaining areas of the state with the percentage of crib capacity constructed from this material ranging from 91 percent in the northern counties of Kentucky (stratum 7) to 100 percent in the mountain region of the state.



Typical small farm crib storage for corn, picture taken near Fancy Farm, Ky., in Graves Co. Contrast to modern type storage on cover.

In 1954, farmers in the state indicated that 45 percent of their corn cribs gave the grain good **weather protection**, another 45 percent gave fair protection from the weather, while the remaining 10 percent gave poor protection from rain and snow. The percentage of corn cribs giving good weather protection was highest in the commercial corn area of stratum 3 and in the northern counties of stratum 7. Of those facilities giving fair weather protection to corn, the highest percentages were found in the Jackson Purchase area of stratum 1 and in strata 4 and 5. Corn storage facilities giving poor weather protection were of greatest abundance in the mountain area of stratum 8.

Survey data also indicated that 89 percent of Kentucky's on-farm corn storage facilities were not **rat proof**. As would be expected, this percent was highest in those areas that reported a high percentage of wood constructed corn cribs and lowest where cribs were constructed from metal or concrete.

Of those corn growers in Kentucky who answered the question as to whether corn in storage on their farms could be **fumigated for weevil control**, 60 percent gave a negative answer; but in the commercial corn producing area of stratum 3, 63 percent of farmers reporting indicated that corn in storage could be fumigated. In the central Blue Grass area of stratum 6 and in the

northern counties of stratum 7, around 50 percent of reporting farmers indicated that corn in storage could be fumigated. However, in the remaining areas of the state from 60 to 80 percent of reporting farmers indicated that their storage facilities for corn were not suitable for fumigation.

Survey data indicated that about 72 percent of the corn cribs in the state were **properly ventilated**. All areas but stratum 6 indicated that most of their corn storage was properly ventilated.

(3) Description of On-Farm Storage Facilities for Small Grains

In order to account for the variance in sizes of small grain bins on Kentucky farms, the **type of material** from which facilities are **constructed** has also been summarized by bushels of storage capacity contained in each type of structure. As might be expected, a larger percentage of small grain bins than corn cribs is constructed from metal. Survey data indicated that 89 percent of the state's small grain capacity was constructed from wood, seven percent from metal, and four percent from other types of construction such as concrete. Small grain storage capacity constructed from wood predominated in all areas of the state. Such wooden facilities ranged from 81 percent of bin capacity in the Jackson Purchase area to 100 percent in the mountain region of stratum 8. The percentage of small grain storage constructed from metal was highest in both the commercial small grain producing area of stratum 2 and in the northern counties of stratum 7 with 14 percent reported in each area and lowest in the mountain region of stratum 8 where none of the grain bins were reported to be constructed from metal. Small grain capacity constructed from materials other than wood or metal was of little importance in any area of the state.



Improved type of steel bin storage for small grains or soybeans, Fulton County, Ky.

The 1954 Kentucky grain survey indicated that 76 percent of the state's on-farm bins for small grains gave good **weather protection**, while 23 percent gave fair protection and one percent gave poor protection. The percentage of grain bins giving good weather protection was highest in the commercial small grain producing area of stratum 2 at 90 percent and lowest in stratum 5 at 47 percent. The percentage of grain bins giving fair weather protection presented just the opposite picture, in stratum 5 about 50 percent of the facilities were reported in this classification while the lowest percentage was in stratum 2 where 10 percent of the small grain bins gave only fair protection. Other areas of the state ranged between the above mentioned extremes.

Survey data also indicated that 87 percent of Kentucky's on-farm small grain storage facilities were not **rat-proof**, leaving 13 percent that were rat-repellent. The percentage of small grain bins that were rat-proof ranged from a reported 25 percent in the northern counties of stratum 7 to a low of 5 percent in strata 2 and 5.

Fifty-six percent of the farmers in the state reporting on the 1954 grain survey indicated that their small grains in on-farm storage could be **fumigated** for weevil control. This percentage ranged from 79 percent in the Blue Grass region of stratum 6 to 36 percent in the Jackson Purchase area of stratum 1.

Reports from grain producers in 1954 indicated that 78 percent of the small grain bins in the state were **properly ventilated**. The largest proportion of properly ventilated grain bins was reported in the commercial grain producing area of stratum 2 and the lowest percentage in stratum 4. These percentages were 88 and 53 respectively.

(4) Protection and Care Given to Grains in Storage

Causes of Damage to Grains in Storage: Sixty-three percent of the grain producers in the state reporting on the 1954 grain survey indicated that their farm stored grains were frequently damaged by rats and mice. Frequent damage to grains by weevils was reported by 55 percent of the farmers, with only seven percent reporting damage due to excessive moisture.

Grains Fumigated: Of the grains stored on farms in Kentucky in 1954, corn and wheat were the only two reported as usually fumigated. Sixty-seven percent of the farmers reported fumigation of corn and 33 percent reported fumigation of wheat.

Methods Used in Handling Wet Grains: When asked the question: "What method do you generally use in handling wet grain?", 95 percent of the farmers of the state reported shoveling, one percent reported forced air, and four percent had their grain dried by commercial facilities. These percentages were quite consistent in all areas of the state except for the commercial grain producing area of stratum 2 where 19 percent of the grain producers reported having their grains dried by commercial facilities.

Storage of Small Grains: Kentucky farmers reported bulk storage as the most popular type of on-farm storage for small grains. Fifty-six percent of these

farmers reported the use of bulk storage for storing their small grains, 33 percent reported storing their grain in sacks, and 11 percent said they used both of these methods. Bulk type storage was the most popular type of on-farm small grain storage in all areas of the state but two. In the Jackson Purchase (stratum 1) 52 percent of the farmers reported using sacks for small grain storage, 37 percent reported bulk storage and 11 percent used both methods of storage. In the mountainous region of stratum 8, 38 percent reported storing small grains in sacks, 34 percent reported using bulk storage and 28 percent used a combination of the two methods.

(5) Storage Capacity vs. Storage Needs

Most Storage Space Used at Any One Time in Last Three Years Compared to Capacity: In 1954 when Kentucky farmers were asked the question: "What was the most grain storage space you used at any one time on this farm during the past three years?"; their answers indicated that only 86 percent of the state's total capacity for **ear corn** was used. The most storage space used within the state ranged from a high of six percent above total crib capacity in the commercial corn producing area of stratum 3 to a low of 54 percent of capacity in the mountain area of stratum 8.

For **small grains**, the ratio of the most storage space used in the past three years to total capacity indicated that Kentucky farmers had stored 1.2 times the total capacity of **small grains** in 1954. In the commercial small grain area of stratum 2, farmers indicated that they had stored only 92 percent of their small grain capacity in 1954. Reports from some mid-southern and eastern counties indicated that farmers had stored as much as 1.5 times their 1954 small grain capacity. Much of this storage of small grain over and above reported capacity may be accounted for by storage of grains in sacks.

Additional Storage Needs Compared to Capacity: The Kentucky grain survey indicated that farmers felt they needed 13 percent more space for ear corn than they had in 1954. Within the state these needs ranged from six percent of their 1954 capacity in the Blue Grass region of stratum 6, to 22 percent in stratum 4.

Additional storage space was somewhat more pressing for small grains. Answers to survey questions indicated that grain producers thought they needed 56 percent more small grain storage space than they had in 1954. Additional storage space needed within the state ranged from 30 percent in the Blue Grass region of stratum 6 to 108 percent in the commercial producing area of stratum 3.

All of these additional storage facilities could not be justified by farmer reports on the use being made of existing facilities.

VIII CONCLUSIONS:

In general, grain production in Kentucky is declining. Only a portion of the State can be classed as a commercial grain producing area. Farm storage problems can be found on individual farms but the State as a whole appears

to be fairly well supplied with cribs and bins, especially if grains continue to be handled and disposed of in the manners currently used. Off-farm storage also appears to be adequate to meet most normal situations and some emergencies, as far as space is concerned. But, there are a lot of improvements that could be made in existing facilities that would aid the flow and handling of grain during rush periods at harvest time. Modernization and enlarging of weighing and unloading facilities would be a big help to the users of the services supplied by many Kentucky mills and elevators.

